REMARKS

Claims 1-11 are currently pending in this application, of which Claims 6-11 have been withdrawn from consideration as being directed to a non-elected invention. Accordingly, in the foregoing amendment, Claims 6-11 have been cancelled, without prejudice to or disclaimer of the subject matter thereof.

Claims 1 and 4 have been rejected under 35 U.S.C. §103(a) as unpatentable over Balling et al (U.S. Patent No. 5,397,545) in view of Pratt et al (U.S. Patent No. 6,132,895), while Claims 2 and 3 have been rejected over the same two references, and further in view of Farooque et al (U.S. Patent No. 6,200,696), and Claim 5 has been rejected as unpatentable over the same two references and further in view of Lee et al (U.S. Patent No. 6,168,703). However, for the reasons set forth hereinafter, Applicants respectfully submit that Claims 1-5 and new Claims 12-22 distinguish over the cited references, whether considered separately, or in combination.

The present invention is directed to an apparatus for catalytic reaction of a reaction mixture, such as steam reformation of methanol, so-called hydrogen shift reactions, oxidation of carbon monoxide and catalytic combustion of a combustible educt. In such apparatus, a catalytic reactor is formed by a stack of layers, which are made of a gas permeable catalytic material, as shown in Figure 2 of the application. Alternate layers contained in the stack include distribution channels, which conduct a reaction mixture which enters the reactor via educt

channels 12. The remaining layers contain collecting channels 14, which collect the reaction product and conduct it to product channels 16. For the purpose of stimulating the reaction, the reaction mixture is placed under pressure so that it diffuses through the gaseous catalytic material of the respective layers, from the distribution channels to the collection channels, which convey the reaction products to a discharge outlet via the product channels. Because the respective layers of the reactor stack are made of a gas permeable material, it is necessary to prevent gases which are diffusing through such material from exiting the side edges of the respective layers and being discharged into the atmosphere. In prior art reactors of this type, this problem has been dealt with by providing a metal housing surrounding the stack of layers.

The Balling et al reference discloses a catalytic converter for catalytic reaction of a reaction mixture, in which the composition of the catalytic material varies linearly along the gas flow path in order to regulate the temperature within the reactor. In the embodiment of Figure 2, referred to in paragraph 6 of the Office Action, the reactor is formed by a plurality of catalyst carriers 26, 28, 30 and 32, each of which carries a chemical composition of a catalytically active substance 33a-33d, as discussed at Column 6, lines 53-58. In particular, in the example given, the carrier is made of aluminum oxide applied to a ceramic substrate structure. A plurality of gas channels 34 extend longitudinally through the respective layers of the carrier structure, so that exhaust gas 36 which enters the channels 34 at the top, flows through them and exists at the bottom, as indicated in Figure 2. The gas flows through the channels without

apparent obstruction or significant pressure drop, so that diffusion through the carrier structure itself is not an issue which arises, or needs to be addressed.

The Pratt et al reference, on the other hand, discloses a fuel cell which is made up of an alternating stack of membrane electrode assemblies (MEA) and double sided distribution plates which have fuel and oxidant distribution channels on opposite sides thereof. (See, for example, Column 2, lines 33-47; Column 3, lines 62-66.) The distribution plates are made of a gas impermeable material, as stated, for example at Column 2, lines 44-45 and Column 4, lines 46-47, while the MEA's consist of a solid electrolyte framed by a sealing material such as rubber, or expanded polytetrafluoroethylene. (See Column 2, lines 35-38.) Therefore, the fuel and the oxidant remain separated as they move from one distribution plate to the next, via the channels on opposite sides of the distribution plates, as well as the holes between plates. (See Column 5, lines 58-62.) Finally, as noted at Column 6, lines 5-6, if desired, the walls of the stack may be potted or coated with a sealant, such as epoxy to provide a gas-tight fuel cell.

Claim 1 as amended recites apparatus for carrying out a catalyzed reaction comprising a stack of layers of catalyst material, each having distribution or collection channels therein. As recited in the penultimate paragraph, the catalyst material of the layer comprises a gas permeable material that provides a gas flow path that penetrates through the gas permeable material, so that the reaction mixture passes from the distribution channels to the collection channels by diffusing through the layers of the reactor apparatus.

Finally, Claim1 recites that the lateral edge surfaces of the respective gas permeable layers have an edge seal that prevents gases diffusing through the layers from exiting the edge surfaces.

It is apparent from the foregoing brief description that neither Balling et al nor Pratt et al also teaches or suggests a reactor apparatus in which the respective layers are made of a gas permeable catalyst material, through which the reaction mixture diffuses as the reaction takes place. That being the case, the issue of reaction gases diffusing through the gas permeable catalytic material and exiting on the exposed lateral edges of each of the respective layers of the reactor does not occur. While the Pratt et al reference refers generally to potting or coating of the reactor stack, it neither teaches nor suggests a reactor stack made of a porous material, through which gas diffuses, as described, nor does it refer to sealing edges of the layers themselves. Accordingly, Applicants respectfully submit Claims 1-6 and 12-22 distinguish over the cited references.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and

please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #1748/49133).

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO THE CLAIMS

Please amend the claims as follows:

1. (Amended) An apparatus for carrying out a [heterogeneously] catalyzed reaction, comprising:

a stack comprising a plurality of layers on top of one another, each layer comprising a catalyst material and having distribution and collection channels for conducting educts of a reaction mixture and reaction products, respectively;

a plurality of end plates that bound said stack in a stacking direction, [wherein] at least one end plate [has] having supplying or discharging lines that are connected with said channels; wherein,

said catalyst material of said layers comprises a gas permeable material, providing a gas flow path that penetrates through said gas permeable materials, whereby said reaction mixture passes from said distribution channels to said collection channels by diffusing through said layers;

[wherein] lateral edge surfaces of said [plurality of] layers, which edge surfaces collectively form lateral surfaces of said stack, have an edge seal [(30) in an edge region or on a surface extending transversely to the stacking

direction.] that prevents gases diffusing through said layers from exiting said edge surfaces.